ASUS DSL-N12U

Introduction

For quite a long time our testing laboratory hadn’t got an ADSL-switch at our disposal which didn’t give us a possibility to test ADSL routers. That’s why when we obtained DSLAM D-Link DAS-3248EC, we made up our minds to not limit our tests with this vendor’s devices only, but we also asked some other companies for their ADSL-modem. That’s how we got an ASUS DSL-N12U wireless router in our lab, and here’s its review below.

External design and hardware

An ASUS DSL-N12U wireless ADSL-router is designed in a black case made of shiny plastic with a grey horizontal panel and dimensions of 179x119x37 mm (excluding the external antennas). For its work the device requires an external power source with the following characteristics: 12V and 1.5A.

On the front panel there is the model name engraved and some LEDs indicating status of the device and its ports: four for the LAN ports, one for Wi-Fi, an ADSL light indicates the connection with the provider’s equipment (if it doesn’t work, the further adjustment is of no use), and Internet shows the connection to the provider in the mode PPPoA/PPPoE.

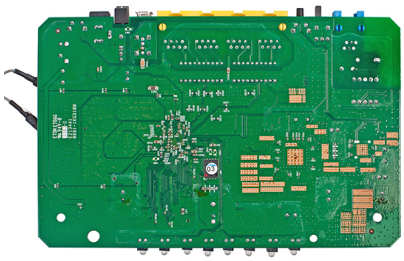
The side panels are quite featureless: there is a grey plastic panel as well and some small holes for ventilation.

The upper panel is shiny and there’s a 3D brand tag on it. The lion’s share of this panel is occupied with a vent.

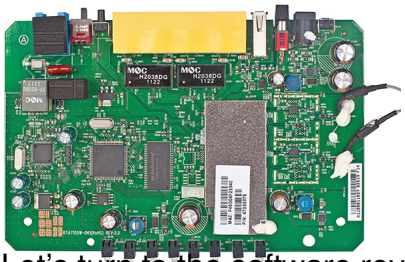
Most part of the device bottom is occupied by the vent and more than that, there is a sticker with some brief information about the model, four rubber stands and two T-shaped technological holes which allow placing the DSL-N12U both on the table and on the wall.

On the rear panel there are two non-detachable external antennas with the amplifying factor of 5dBi. Also one can find here four Fast Ethernet ports, one port for connecting the phone line, one USB 2.0 interface, the on/off button, the wireless module Power button and two small round buttons to reset the user's settings and to simplify connection of new wireless devices.

Now let's have a look inside the device. All the electronic stuffing is presented by one green textolite board which main elements are located on one side.



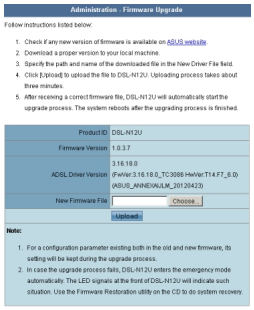
The whole system is based on the SoC chip from the Ralink company. Only three chips are not covered: the Winbond W981 6G6IH
flash-drive with the capacity of 2Mbyte, the TrendChip TC3162LE-LQ128G CPU and the TrendChip TC3086-QFN64-EPG module which is responsible for working with ADSL.

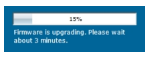


Let’s turn to the software review of the router.

Firmware upgrade and add-ons

The procedure of firmware upgrade in ASUS DSL-N12U is similar to those models that are suitable for the most of the wireless devices from this vendor – you just need to select the file with a new firmware in the point “Firmware upgrade” in the group “Administration” and press the button “Upload”.


Administration - Firmware Upgrade
Follow instructions listed below:
1. Check if any new version of firmware is available on ASUS website.
2. Download a proper version to your local machine.
3. Specify the path and name of the downloaded file in the New Driver File field.
4. Click [Upload] to upload the file to DSL-N12U. Uploading process takes about three minutes.
5. After receiving a correct firmware file, DSL-N12U will automatically start the upgrade process. The system reboots after the upgrading process is finished.
Product ID
DSL-N12U
Firmware Version
1.0.3.7
ADSL Driver Version
3.16.18.0
(FwVer:3.16.18.0_TC3086 HwVer:T14.F7_6.0) (ASUS_ANNEXAULM_20120423)
New Firmware File
Choose...
Upload
Note:
1. For a configuration parameter existing both in the old and new firmware, its setting will be kept during the upgrade process.
2. In case the upgrade process fails, DSL-N12U enters the emergency mode automatically. The LED signals at the front of DSL-N12U will indicate such situation. Use the Firmware Restoration utility on the CD to do system recovery.



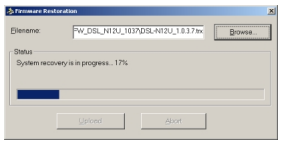
The entire process takes approximately three minutes and doesn’t require any special skills from the user. The firmware version is displayed in the point “Firmware upgrade” of the “Administration group” and on the main page of the router itself.

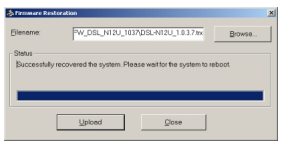
If some malfunction occurs while firmware is being updated, ASUS DSL-N12U enters the

recovery mode characterized by the power LED slow blinking. It should be mentioned that the user can manually turn on this mode of the router by switching on the device with the Reset button and holding it during ten seconds. Some minor features pointing out the recovery mode of DSL-N12U can be the lack of echo-replies of the protocol ICMP and the fact that its MAC-address becomes equal to 4040.4040.4040.

```
  C:>ping 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.1.1:
 Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
Interface: 192.168.1.2 --- 0x36
 Internet Address      Physical Address      Type
 192.168.1.1         40-40-40-40-40-40     dynamic
```

To restore the firmware it's necessary to use the ASUS Firmware Restoration utility which is a part of the software set for this very model. The restoration procedure is quite simple: you need to choose the file with the firmware needed and click the button "Upload", all the rest will be accomplished by the utility itself.



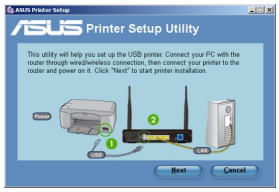


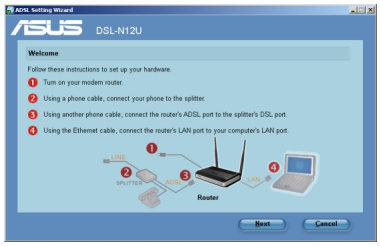
You can restore the firmware manually, without using any special utilities. It is required to change the IP-address from which the recovery is going to take place. You can find it out with the help of traffic capturing via the Wireshark or TCPdump utilities, generated by the device into the LAN-segment. In our case, ASUS DSL-N12U regularly sent the APR-requests about the address 192.168.1.20, that's why we used exactly this value for our IP-address of the testing

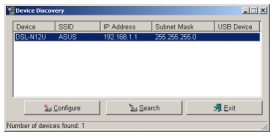
host. After changing the IP-address it's necessary to send the file with the required firmware to the device with the help of the TFTP protocol and wait for the device to reboot. All the commands are shown below.

```
  C:>tftp -i 192.168.1.1 put c:DSL-N12U_1.0.3.7.trx
Successful transfer: 4348652 bytes in 4 s, 1087163 bytes/s
C:>ping -t 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 192.168.1.1: bytes=32 time=2000ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
```

Besides the above-mentioned utility there are also three more ones in the software set for DSL-N12U: Printer Setup, ADSL Setting Wizard and Device Discovery that allow a user/an administrator to install on the stationary PC a printer connected to the router USB port, to configure all the settings of the router for it to work with a certain provider and to detect DSL-N12U in the local segment of the network.



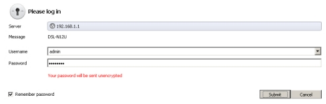




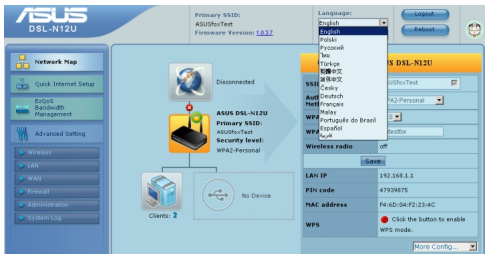
Scrutinizing the abilities of each utility is beyond this review, so let’s just turn to the review of the device web-interface.

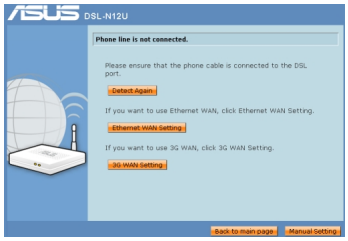
Web-interface

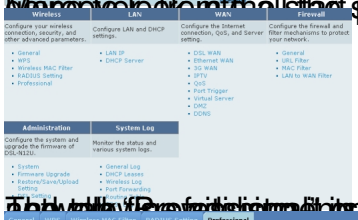
To access the web- interface of the wireless ADSL-router any modern browser can be used. The IP-address of the LAN-interface is 192.168.1.1 by default, the login is admin.

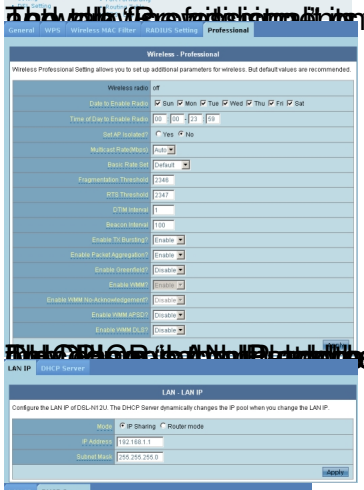


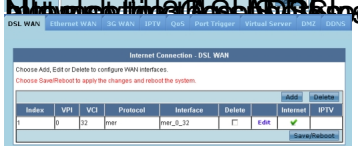
Having logged in all the necessary data, the user gets on the start page of the device from which s/he can pass over to the Internet connection Wizard or to the page for configuration of all the preferable traffic types. The ASUS DSL-N12U web-interface is available in 14 languages.

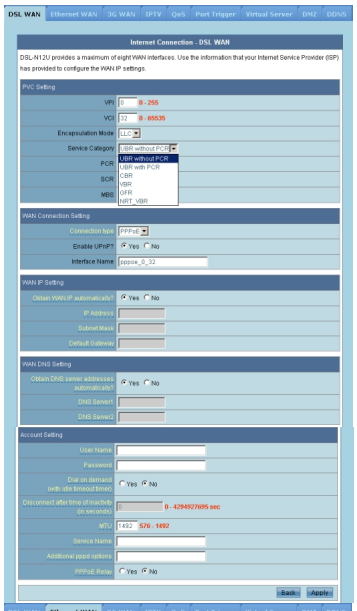


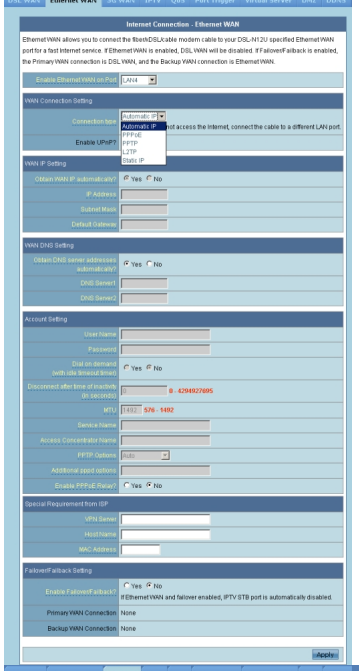


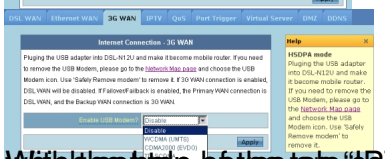






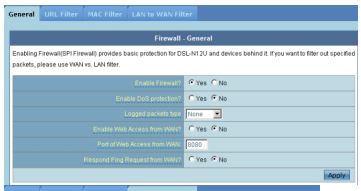


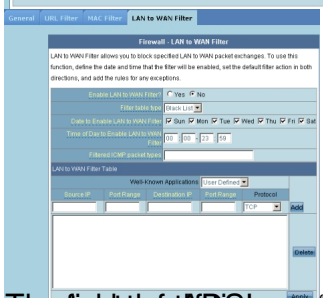


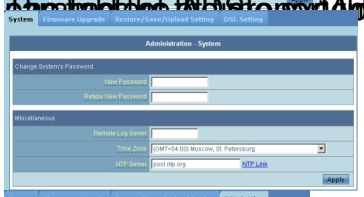

DSL WAN
Ethernet WAN
3G WAN
IPTV
QoS
Port Trigger
Virtual Server
DMZ
DDNS
Internet Connection - 3G WAN
Plugging the USB adapter into DSL-N12U and make it become mobile router. If you need to remove the USB Modem, please go to the Network Map page and choose the USB Modem icon. Use 'Safely Remove modem' to remove it. If 3G WAN connection is enabled, DSL WAN will be disabled. If Failover/Failback is enabled, the Primary WAN connection is DSL WAN, and the Backup WAN connection is 3G WAN.
Enable USB Modem?
Disable
Apply
Help
HSDPA mode
Plugging the USB adapter into DSL-N12U and make it become mobile router.
If you need to remove the USB Modem, please go to the Network Map page and choose the USB Modem icon. Use 'Safely Remove modem' to remove it.

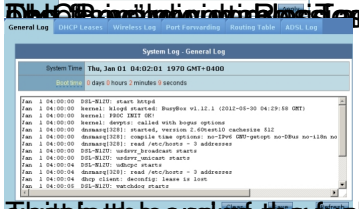
With the help of the tab “IPTV” of the router configuration you can configure the device. Some other router settings are also found here.

The configuration of the ports can be done globally in the tab of the IPTV. Additionally, it is possible to set up the MAC addresses of the IPTV devices connected to the ports and to assign them to a VLAN.









switch to the command line interface of the ASUS DSL-N12U wireless ADSL-router. Let's

Command line

To access the command line via the Telnet protocol it's necessary to log in using the same password as to access the router web-interface. The operating system of the ASUS DSL-N12U wireless router is Linux version 2.6.21 and BusyBox version 1.12.1.

```
 DSL-N12U login: admin
Password:
BusyBox v1.12.1 (2012-05-30 04:29:58 GMT) built-in shell (ash)
Enter 'help' for a list of built-in commands.
# busybox
BusyBox v1.12.1 (2012-05-30 04:29:58 GMT) multi-call binary
Copyright (C) 1998-2008 Erik Andersen, Rob Landley, Denys Vlasenko
and others. Licensed under GPLv2.
See source distribution for full notice.
Usage: busybox [function] [arguments]...
```

```
 or: function [arguments]...
 BusyBox is a multi-call binary that combines many common Unix
 utilities into a single executable.  Most people will create a
 link to busybox for each function they wish to use and BusyBox
 will act like whatever it was invoked as!
Currently defined functions:
 [, [[, arp, ash, basename, brctl, cat, chmod, chpasswd, cp, date,
 dd, echo, expr, free, ftpget, ftpput, grep, hostname, ifconfig,
 insmod, kill, killall, klogd, ln, logger, login, logread, ls, lsmod,
 mdev, mkdir, mknod, mount, mv, netstat, nslookup, ping, ps, pwd,
 rm, rmmod, route, sed, sh, sleep, syslogd, telnetd, test, tftp,
 top, touch, traceroute, umount, vconfig, vi, wc, zcip
# cat /proc/version
Linux version 2.6.21 (asus@localhost) (gcc version 3.4.2) #1826 Wed May 30 12:38:35 CST
2012
```

Using the command ps let's see what processes are running at the moment. The top utility will display the data on the current work of these processes.

```
 # ps
PID USER       VSZ STAT COMMAND
1 admin     2700 S    /init
2 admin        0 SWN  [ksoftirqd/0]
3 admin        0 SW<  [events/0]
4 admin        0 SW<  [khelper]
5 admin        0 SW<  [kthread]
30 admin       0 SW<  [kblockd/0]
33 admin       0 SW<  [khubd]
45 admin       0 SW<  [kswapd0]
46 admin       0 SW   [pdflush]
47 admin       0 SW   [pdflush]
48 admin       0 SW<  [aio/0]
182 admin      0 SW   [mtdblockd]
263 admin      0 SW<  [dwc_otg]
285 admin      0 SW   [RtmpWscTask]
316 admin   1552 S    tp_init
318 admin   1732 S    /sbin/syslogd -m 0 -t UTC-4 -O /tmp/syslog.log
320 admin   1732 S    /sbin/klogd
322 admin   3152 S    httpd eth2.1
326 admin   1780 S    /usr/sbin/infosvr br0
327 admin   1116 S    /usr/sbin/udhcpd /tmp/udhcpd.conf
329 admin   1204 S    dnsmasq -C /tmp/dnsmasq.conf
331 admin   1568 S    lpd
332 admin   2376 S    u2ec
333 admin   2376 S    u2ec
```

```
 334 admin     2692 S    usdsvr_broadcast
 335 admin     2692 S    usdsvr_unicast
 337 admin     2376 S    u2ec
 340 admin     1196 S    lld2d br0
 341 admin     1468 S    /usr/sbin/wanduck
 347 admin     2268 S    /usr/sbin/pppd file /tmp/ppp/options.wan0
 358 admin     1452 S    internet_led
 360 admin        0 Z    [failover_monito]
 362 admin        0 Z    [failover_3g]
 363 admin     2692 S    watchdog
 376 admin     2692 S    ntp
 379 admin     2692 S    ots
 391 admin     1736 R    telnetd
 392 admin     1788 S    networkmap
 393 admin     1740 S    /bin/sh
 450 admin     1748 S    -sh
 485 admin     1736 R    ps
#top
Mem: 22276K used, 6376K free, 0K shrd, 0K buff, 12824K cached
CPU:   0% usr   8% sys   0% nice  91% idle   0% io   0% irq   0% softirq
Load average: 0.00 0.01 0.00
 PID  PPID USER     STAT   VSZ %MEM %CPU COMMAND
 492   450 admin    R     1740   6%   8% top
 322     1 admin    S     3152  11%   0% httpd eth2.1
 1     0 admin    S     2700   9%   0% /init
 363     1 admin    S     2692   9%   0% watchdog
 376     1 admin    S     2692   9%   0% ntp
 379     1 admin    S     2692   9%   0% ots
 334     1 admin    S     2692   9%   0% usdsvr_broadcast
 335     1 admin    S     2692   9%   0% usdsvr_unicast
 333   332 admin    S     2376   8%   0% u2ec
 332     1 admin    S     2376   8%   0% u2ec
 337   333 admin    S     2376   8%   0% u2ec
 347     1 admin    S     2268   8%   0% /usr/sbin/pppd file /tmp/ppp/options.w
 392     1 admin    S     1788   6%   0% networkmap
 326     1 admin    S     1780   6%   0% /usr/sbin/infosvr br0
 450   391 admin    S     1748   6%   0% -sh
 393     1 admin    S     1740   6%   0% /bin/sh
 391     1 admin    S     1736   6%   0% telnetd
 318     1 admin    S     1732   6%   0% /sbin/syslogd -m 0 -t UTC-4 -O /tmp/sy
 320     1 admin    S     1732   6%   0% /sbin/klogd
 331     1 admin    S     1568   5%   0% lpd
 316     1 admin    S     1552   5%   0% tp_init
```

Let’s find out what files are located in the catalogues /bin, /sbin, /usr/bin and /usr/sbin.

```
 # ls /bin
chmod           gpio            sdparm          ated
cp              lld2d           ls              flash
umount          rm              grep            iptables-restore
mii_mgr         busybox         wscd            dnsmasq
rt2860apd       kill            iwconfig        iwpriv
ash             ping            switch          sleep
mkdir           touch           mount           spicmd
dd              igmpproxy       ez-ipupdate     tc
login           usb_modeswitch  sed             sh
cat             iptables        hostname        upnp_xml.sh
mv              echo            pwd             reg
ln              mtd_write       vi
mknod           upnpd           comgt
ps              date            netstat
# ls /sbin
gen_ralink_config               halt
lsmod                           start_ddns
wan-up                          ATE_Get_MacAddr_2G
start_telnetd                   start3g
sta_wps_stop                    run_ftp
getSiteSurvey                   ATE_Get_ResetButtonStatus
wps_pin                         ATE_Get_PINCode
hso_connect.sh                  rc
ip-down                         FWRITE
vconfig                         start_ots
erase                           hotplug_usb_mass
test_of_var_files_in_mount_path  get_device_id
ATE_Set_PINCode                 gbe
run_ftpsamba                    config.sh
atehelp                         ntp.sh
disktest                        asuscfe
wps_start                       restart_dns
getChannel                      ATE_Set_RegulationDomain
switch_to_3gwan                 write_smb_conf
setCountryCode                  radioctrl
getBSSID                        getBootV
ATE_Set_PowerLedOn              getPIN
greenap.sh                      vpn-passthru.sh
tracktest                       wps_oob
udhcpc.sh                       setBootV
auth-down                       apcli_monitor
nvram_restore                   zcip
gbr                             ejusb
config-pppoe.sh                 getIMG
auth-up                         apcli_connect
```

gpio_setbit ATE_Get_RegulationDomain
3ginfo.sh getSSID
ddns.sh run_apps
ddns_updated reboot
wmac switch_to_dslwan
start_ntp setMAC
insmod getStaConnectionSSID
setPIN init
hotplug run_upnp
watchdog stop_ftp
convert_asus_values get_sw
ifconfig rsrom
route automount.sh
config-pptp.sh ATE_Get_BootLoaderVersion
usdsvr_broadcast nat.sh
get_modem_node ATE_Get_WpsButtonStatus
stop3g ip-up
usbtpt dev_init.sh
restart_qos wan.sh
chpasswd.sh config-udhcpd.sh
ledoff ATE_Set_RestoreDefault
wan-down ping_keep_alive
apcli_set gpio_wrint
rmmod gpio_rdint
usdsvr_unicast gpiotest
chg_to_ethwan sigmon
logmessage restore
write ATE_Get_SWMode
wsrom ATE_Set_PowerLedOff
pspfix getApCliInfo
ots startWan
ATE_Get_WlanButtonStatus sta_wps_pbc
3gsqmon.sh klogd
initial_var_file send_sms
dhcpc_apply_delayed setDisassociate
ATE_Get_FWVersion getMAC
ateshow spiread
wps_pbc speedtest
3g.sh config-3g-ppp.sh
umount2 getCurrentAddress
config-dns.sh config-igmpproxy.sh
read_sms getCountryCode
ATE_Set_MacAddr_2G wphy
ATE_Set_StartATEMode ntp
ledon syslogd
ATE_Get_Usb2p0_Port1_Infor getWPSAP

```
mdev                    eject_usb1
chkalltask              stopservice
gpio_setdir             wifi_unload.sh
wps_stop                arp
config-l2tp.sh          logread
chg_to_dslwan           global.sh
# ls /usr/bin
test      nslookup  ftpget    expr      free
killall   traceroute ftpput    [         basename
top       tftp      logger    wc        [[
# ls /usr/sbin
arpstorm        internet_led    udhcpd          failover_monitor
pppd            tp_init         ntpclient       spiflash
infosvr         telnetd         pppoe-relay     chpasswd
networkmap      nvram           l2tp-control    u2ec
lpd             adslate         udhcpc          l2tpd
brctl           wanduck         udpxy           failover_3g
httpd           bpalogin        auto_det
#
```

Now let's move to the catalogue /proc and have a look at the files we can find here and learn the uptime of the operating system and its average load, and get the information about the installed CPU and the RAM capacity.

```
 # cd /proc/
# ls
527         337         263         loadavg     interrupts  sys
450         335         182         uptime      slabinfo    irq
393         334         48          meminfo     buddyinfo   misc
392         333         47          version     vmstat      scsi
391         332         46          filesystems zoneinfo    ioports
379         331         45          cmdline     diskstats   iomem
376         329         33          locks       modules     timer_list
363         327         30          execdomains kcore       kallsyms
362         326         5           mounts      net         swaps
360         322         4           kmsg        sysvipc     crypto
358         320         3           devices     fs          mtd
347         318         2           cpuinfo     driver      rt2880
341         316         1           partitions  tty         Config
340         285         self        stat        bus         spiflash
# cat uptime
1335.37 1316.40
# cat loadavg
0.00 0.00 0.00 3/41 530
# cat cpuinfo
```

```
system type             : Ralink SoC
processor               : 0
cpu model               : MIPS 24K V4.12
BogoMIPS                : 255.48
wait instruction        : yes
microsecond timers      : yes
tlb_entries             : 32
extra interrupt vector  : yes
hardware watchpoint     : yes
ASEs implemented        : mips16 dsp
VCED exceptions         : not available
VCEI exceptions         : not available
# cat meminfo
MemTotal:        28652 kB
MemFree:          6320 kB
Buffers:             0 kB
Cached:          12828 kB
SwapCached:          0 kB
Active:           7280 kB
Inactive:         7752 kB
SwapTotal:           0 kB
SwapFree:            0 kB
Dirty:               0 kB
Writeback:           0 kB
AnonPages:        2244 kB
Mapped:           1688 kB
Slab:             4344 kB
SReclaimable:      952 kB
SUnreclaim:       3392 kB
PageTables:        392 kB
NFS_Unstable:        0 kB
Bounce:              0 kB
CommitLimit:     14324 kB
Committed_AS:     5652 kB
VmallocTotal:  1048404 kB
VmallocUsed:      2188 kB
VmallocChunk:  1045676 kB
```

We can’t help mentioning the nvram utility which allows changing the important parameters of the device.

```
  # nvram
usage: nvram [get name] [set name=value] [unset name] [show]
# nvram show | grep pass
size: 17698 bytes (15070 left)
```

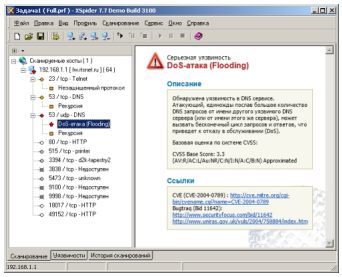
wan_pppoe_passwd=
hsdpa_pass=
http_passwd=password
wan0_pppoe_passwd=test
dsl_pppoe_passwd0=
dsl_pppoe_passwd1=
dsl_pppoe_passwd2=
dsl_pppoe_passwd3=
dsl_pppoe_passwd4=
dsl_pppoe_passwd5=
dsl_pppoe_passwd6=
dsl_pppoe_passwd7=
usb_ftppasswd_x=
ethwan_pppoe_passwd=test
ddns_passwd_x=
acc_password=

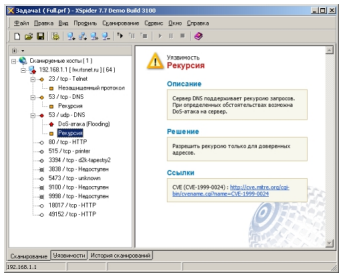
This brings us to the end of the device command line interface review of the ASUS DSL-N12U wireless ADSL-router and pass over to the testing section.

Testing

The first test which we always start this section with is estimation of the device booting time under which we mean the time interval between switching the power on and receiving the first echo reply via ICMP. ASUS DSL-N12U boots within 27 seconds and we find it a good result.

Our second usual test is to check the security of the device via the Positive Technologies XSpider 7.7 (Demo build 3100) security scanner. On the whole there were twelve open ports detected: TCP-23 (Telnet), TCP-53 (DNS), UDP-53 (DNS), TCP-80 (HTTP), TCP-515 (printer), TCP-3394 (d2k-tapesty2), TCP-3838 (Unavailable), TCP-5473 (unknown), TCP-9100 (Unavailable), TCP-9998 (Unavailable), TCP-18017 (HTTP) and TCP-49152 (HTTP). The most significant information is shown below.

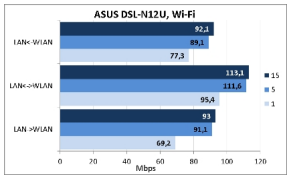




Now it’s time for the most long-wanted tests of our readers – the device performance tests. In the table below we display all the main parameters of our testing stand.

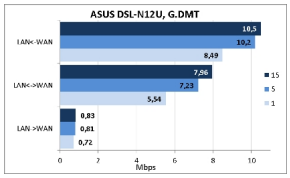
Component	PC	Notebook
Motherboard	ASUS Maximus V Extreme	ASUS M60J
CPU	Intel Core i7 3770K 3.5 GHz	Intel Core i7 720QM 1.6 GHz
RAM	DDR3 PC3-10700 SEC 32 Gbyte	DDR3 PC3-10700 Kingston 8 Gbyte
NIC	Intel Gigabit CT Desktop Adapter	
ASUS EA-N66	Atheros AR8131	
Atheros AR9285		
Operating system	Windows 7 x64 SP1 Rus	Windows 7 x64 SP1 Rus

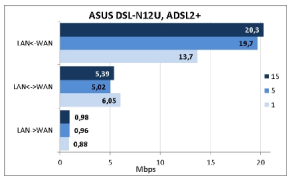
We started with the estimation of the maximum speed of user data transmission through the wireless segment.

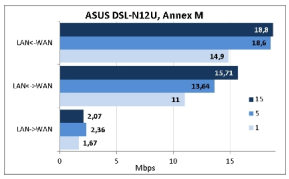


The speeds we got here correspond to the wireless segment performance which means that both wired and wireless networks in DSL-N12U are balanced.

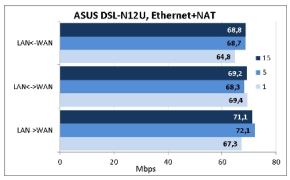
We decided to not limit ourselves with measuring only the maximum speeds that are available in the router, but to check its work in various ADSL-modes.

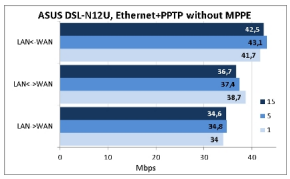


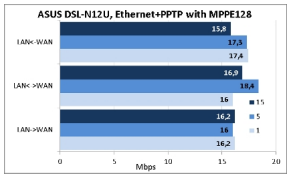




Since ASUS DSL-N12U gives you an opportunity to not only connect to ADSL, but also to Ethernet-providers as well, we made up our minds to find out the speeds which could be available to the user in the following modes: routing and NAT, PPTP tunnel without encrypting and with MPPE128 encrypting.







We finish the testing section now and pass over to a conclusion.

Conclusion

All in all we are satisfied with the ASUS DSL-N12U ADSL-router and a possibility to organize backup connections with the help of wireless USB-modems or Ethernet-providers doubles its attractiveness for ADSL Internet connection.

The good points are listed below.

- External antennas with the amplification gain of 5dB
- Internet connection possibility not only via ADSL, but also using the Ethernet and 3G providers
- Annex M support
- Possibility to switch on/off the wireless module manually and according to the schedule
- Good data transmission speeds through the Ethernet-providers connection

Unfortunately, we can’t miss the drawbacks of the tested model.

- Excessive size of the device web-interface
- It's impossible to connect external disks or flash-drives to USB.

At the moment of writing this article the average price of the ASUS DSL-N12U ADSL-router in Moscow online stores was 2000 rubles.